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EDITORIAL

SCIENCE MARCHES ON!

IT HAS been charged by some that much of our present social discomfort is due to the fact that Science moves ahead too fast and leaves our social structures weak and incomplete. In partial proof of this they call attention to the "great mistakes of public health performances." Thus, they claim, the increase in the span of life, due to the health sciences, only means a larger quota of old and useless dependents and an obvious population increase. Conservation of child life, by the same token, piles up the population. Then, too, they call attention to the conquest of the plagues that once provided ample pruning of the much too rapid growth of Adam's progeny. All of these achievements, they say, only incline to add to a population already embarrassed, already too full for comfort, leaving only the hideous instrumentality of war to dam and damn the flood of earth's time-binding parasites. Birth control and the sterilization of the unfit, acknowledgedly the plans and performances of the proponents of the scientific method, are held to be of little significance as bars against overproduction.

More people, with less to do, again because of progress in the mechanical sciences, add to the world's dilemma. The mechanizing and standardizing of the industries have robbed the willing workman of his chance to live in decent comfort—and the dole will be eventually the most significant weapon in the barren armory of the great New Deal.

All of these things, and more, they allege, are due to the rabid, rapid, scientific progress.

"Slow up" is their challenge and charge to technology.

"Catch up" is the answer of Science!!

Conceit, not courage, is too frequently the force that finds an editorial writer rushing madly to the front page. He loves to see his dressed-up thoughts parade the promenade of print. "A panoply of phrase without a single fact"—such was the newspaper editorial the reading of which occasioned this bit of writing. This is how the editorial ended!

> "Let Science lag a while—invention hide its head—the professor sleep a long, long sleep, and soon enough the destinies of the world will take a better turn. Let Science stop its foolish challenge to the gods!"

How inane! How asinine!

For so little it is, after all, that humanity knows—and how much its destinies, science or no science, still rest and ever will rest in the limber laps of the gods who nod serenely on Olympus.

And those who fear the day when man himself shall reach Olympus, need worry none—for

> "like the day, in flight before the night,
> God calls his caravan—at man's approach
> Calls his swift caravan—and moves, moves on."

That dreaded, dreadful day will never come when man, for all his progress, dare shake his fist at heaven and heave his challenge at the gods.

. . .

In the meantime Science *will* carry on—and the record of progress for the year just tucked away by Chronos shows that it is the professors and not the dictators, the scientists and not the sociologists, who lead the race to real achievements.

Read this record of the progress † of science in certain fields during 1934.

Chemistry

Triple weight hydrogen, three times as heavy per atom as the ordinary kind, was discovered at Cambridge's Cavendish Laboratory by Lord Rutherford and Drs. M. L. Oliphant and P. Harteck; at Carnegie Institution's Department of Terrestrial Magnetism by Dr. M. A. Tuve, L. R. Hafstad and Odd Dahl; at Princeton University

†Abstracted from a copyrighted article by *Science Service.*

by Drs. Gaylord P. Harnwell, Henry D. Smyth, Walker Bleakney and Philip T. Smith.

Existence of helium of atomic mass three instead of four was reported by Dr. P. I. Dee, of Cavendish Laboratory of Cambridge University.

Age-long impact of cosmic rays on the earth's surface caused the formation of the rock-like material of the crust out of the nickel-iron core, is the suggestion of Prof. Gilbert N. Lewis, of the University of California.

A new chemical indicator called "nitrazine yellow" for telling the difference between acid and base solutions at low concentrations was developed by Dr. Henry Wenker.

Protactinium, after uranium the heaviest of all elements in atomic weight, was successfully isolated independently in the United States by Dr. Aristid Von Grosse, University of Chicago, and in Berlin by Drs. Georg Graue and Hans Kading, Kaiser Wilhelm Institute.

The atomic weight of protactinium was measured as 231 times that of hydrogen by Dr. Aristid Von Grosse and M. S. Agruss, of the University of Chicago.

Prof. Enrico Fermi, Italian physicist, reported the production of new material by bombarding uranium, present heavy-weight champion, with neutrons, but later found that what he had mistaken for element No. 93 was really a new form of actinium of atomic number 91.

Propane, a normal constituent of liquefied natural gas, can extract a considerable portion of the so-called Pennsylvania type of ingredient of lubricating oil, making a superior oil out of supposedly inferior western oils, Dr. Ulric B. Bray, of Los Angeles, found.

Specially prepared calcium sulfate or gypsum, called soluble anhydrite, was developed as a drying agent by Prof. W. A. Hammond, of Antioch College, and Prof. J. R. Winthrow, of Ohio State University, useful in dehydrating alcohol and other chemicals.

Isolation in pure crystalline form of a new, very reactive substance, gamma methyl fructoside, from fructose, the sugar of fruits, by Dr. Claude S. Hudson, U. S. National Institute of Health, called in question current chemical views as to the composition of sucrose, the common sugar of commerce.

Citric acid, which makes lemons sour, was extracted commercially from the cheapest kinds of Russian tobacco by Soviet chemists.

A rival for transparent cellulose wrapping material called Pliofilm was made synthetically from rubber which is moisture-proof, elastic and easily sealed by slight heat and pressure.

A new antiseptic, azochloramid, soluble in water and not easily destroyed by heat, was reported to the American Chemical Society by Dr. Franz C. Schmelkes and Henry C. Marks.

Commercial extraction of bromine from sea water was achieved at the Wilmington, N. C., plant of the Dow Chemical Co., by a method which may have also, as a by-product, the extraction of gold from the water.

Various chemicals which stepped out of the "rarity" class into commercial production by carload lots during 1934 include: 1. Acetamide, valuable chemical solvent; 2. Diphenyl oxide, a fluid with high boiling point and chemical stability useful as a heat transfer agent between boiler furnace and high-pressure steam in high temperature boilers, which allows cheaper boiler construction; 3. Boron carbide, industrial abrasive approaching the diamond in hardness, which is made from coke and boron in electric furnaces.

A new method of chemical separation of artificial radioactive isotopes from the parent substance was developed by Drs. Leo Szilard and T. A. Chalmers, of St. Bartholomew's Hospital, London, which, for the case of iodine, involves the use of pure iodine vapor to prevent radioactive iodine atoms, formed by the bombardment of ethyl iodide, from returning to the target. The method appears useful for the concentration of man-made radioactive products of atomic numbers higher than 30.

Medicine

A triumph of obstetric and pediatric practice was the successful delivery and rearing, with every prospect after six months of continued life and health, of the Dionne quintuplets; credit for this medical triumph belongs to Dr. A. R. Dafoe, Canadian "country doctor," who struggled against great odds to save the mother and all five baby girls.

Progress in the fight against infantile paralysis was marked by reports of successful use in humans of two vaccines against the disease, one developed by Dr. Maurice Brodie, of the New York City Health Department, and the other by Dr. John A. Kolmer, Temple University Medical School, Philadelphia.

An anti-influenza horse serum, successful in mice, and a method of using these common laboratory animals for influenza studies were

reported by Drs. C. H. Andrewes, P. P. Laidlaw and Wilson Smith, National Institute for Medical Research, London.

A method of protecting against encephalitis, popularly called "sleeping sickness," but so far applied only to mice, was developed by Drs. Leslie T. Webster and George L. Fite, Rockefeller Institute for Medical Research.

Vaccination against parrot fever or psittacosis was announced by Dr. Thomas M. Rivers, Rockefeller Institute for Medical Research; seven laboratory workers were first to be given this protection, which is not considered practicable as yet for the general population.

Isolation and preparation of the pure substance made by the tubercle bacillus that is responsible for the tuberculin skin test in man and animals was announced by Dr. Florence Seibert, Henry Phipps Institute, Philadelphia.

A new explanation of the cause of glandular diseases, such as exophthalmic goiter, which suggests revision in the method of treating these diseases, arose from the discovery by Dr. J. B. Collip and associates at McGill University that the body develops resistance to certain hormones after prolonged administration, probably because of the presence of antihormones.

Tremendous precocity of growth and development in successive generations of rats as a result of treatment with thymus gland extract and dwarfism in rats as a result of treatment with pineal gland extract, showing that normal stature apparently depends on proper balance between thymus and pineal glands, was obtained by Drs. Leonard G. Rowntree and J. H. Clark, of the Philadelphia Institute for Medical Research and Dr. A. M. Hanson, Faribault, Minn.

Cortin, life-saving hormone of the adrenal gland cortex, was obtained in pure crystalline form for the first time and its chemical formula discovered, Dr. E. C. Kendall, Mayo Foundation, announced.

Sterility was cured in a significant proportion of human beings by giving to one or other parent an endocrine gland preparation to make up for hormone deficit, the late Dr. Allan Winter Rowe, Evans Memorial Hospital, Boston, reported.

The molecular weight and composition of the substance in the thyroid gland, the absence of which causes goiter, was determined by Dr. Michael Heidelberger, Columbia University, New York City.

In the posterior pituitary gland a new factor, probably a new hormone, which controls the activity of the acid-secreting cells of the

stomach and may therefore be of interest in connection with the production of stomach ulcers, was discovered by Drs. E. C. Dodds, R. L. Nole and E. R. Smith, Courtauld Institute of Biochemistry, London.

Success in the treatment of the mental disease, involutional melancholia, by the sex hormone, theelin, was reported by Dr. August A. Werner and associates at St. Louis University School of Medicine.

A method for and preliminary results of transplantation of living grafts of thyroid and parathyroid gland tissues in human patients were reported by Drs. Harvey B. Stone, J. C. Owings and George O. Gey, Johns Hopkins Medical School, Baltimore.

Amidopyrine and chemically related headache and pain-relieving remedies are one if not the sole cause of agranulopenia, fatal bone marrow disease which has been on the increase in recent years, Drs. F. W. Madison and T. L. Squier, Milwaukee, reported and research by many other scientists, including Drs. Roy R. Kracke and Francis P. Parker, Emory University, confirmed.

A substance in the kidney excretion of expectant mothers that produced a tenfold decrease in the growth of cancers in mice was discovered by Drs. Henry J. Ullmann, Fritz Bischoff and Richard D. Evans and L. C. Maxwell, chemist, Santa Barbara, Calif., Cottage Hospital, the International Cancer Research Foundation, Philadelphia, announced.

The cancer-producing property of mineral oil is related closely to the oil's refractivity constant, Dr. C. C. Twort and J. W. Twort, of the Manchester, England, Committee on Cancer found; selection or treatment of lubricating oils with this fact in mind may result in lessening of skin cancer among textile workers, known as mule spinners' cancer, they suggested.

One of the normal constituents of the body, a bile acid, was transformed by simple chemical means into a cancer-producing substance by Dr. J. W. Cook and associates at the London Free Cancer Hospital under a grant from the International Cancer Research Foundation.

The venom of an Indian snake, *Vipera russellii,* contains a substance which very rapidly clots both normal and hemophilic blood in the test tube and which was successful in checking bleeding after dental and other operations in both normal and hemophilic patients, Dr. R. G. Macfarlane, St. Bartholomew's Hospital, London, and Burgess Barnett, curator of reptiles, Zoological Society of London, reported.

Ability to hasten blood-clotting and thus to control hemorrhage is a property of human milk, fresh or dried, but not of milk from other animals, Prof. A. Solé, of Vienna, reported.

Deaths from peritonitis, often fatal infection following abdominal operations, may be reduced by vaccination with a concentrated fraction of bovine amniotic fluid, Drs. Herbert L. Johnson and Edward L. Young, Boston, announced.

A derivative of morphine, dihydrodesoxymorphine-D, made by Dr. Lyndon F. Small, University of Virginia, was patented and will be manufactured under government license for use on patients in order to determine whether it is habit-forming like morphine.

A serum, believed to be the first, that counteracts the effect of the often fatal bite of the black widow spider, was perfected by Dr. Fred D'Amour, University of Denver professor.

New knowledge of how pancreatic enzymes or ferments become active was obtained with the extraction of a new and potent protein-digesting enzyme, chymotrypsin, and a new protein, chymo-trypsinogen, by Drs. M. Kunitz and J. H. Northrop, Rockefeller Institute laboratories at Princeton, N. J.

The outbreak of amebic dysentery starting in Chicago during the fall of 1933 was found by the Chicago City Health Department to be caused by sewage contamination of the water supply of two Chicago hotels.

The cysts which transmit amebic dysentery can be filtered out of water by the usual filtration methods used to purify water supplies, Dr. Bertha Kaplan Spector, U. S. Public Health Service, and John R. Bayliss and Oscar Gullins, chemists of the Chicago Department of Public Works, found in experiments at the Chicago Experiment Filtration Plant.

Complete degeneration of myelin sheath segments of the nerves resulting from strong alcoholic intoxication is permanent, but the slight irritative changes from mild daily intoxication are quickly repaired, Dr. C. C. Speidel, University of Virginia Medical School, learned from observation of frog tadpoles.

A new precise method for destroying successive layers of nerve cells from the brain cortex, thus greatly facilitating the study of localization of function, was announced by Dr. J. G. Dusser de Barenne, Yale School of Medicine.

Alcoholic neuritis, serious nervous disease resulting in paralysis and often death, is due to lack of food and not to the poisonous effect of the alcohol on the peripheral nerves of the body, Dr. Maurice B. Strauss, Thorndike Memorial Laboratory, Boston, reported.

Scurvy-preventing vitamin C is manufactured in the body of infants up to the age of five months, Paul Rohmar, N. Bezsonoff and Ursula Sanders, of the medical faculty of the University of Strasbourg, reported.

Spectrum analysis of vitamin E, which makes possible the identification of this food factor by physical measurements as well as by feeding experiments with animals, was accomplished for the first time by Drs. A. J. P. Martin, T. Moore, Marion Schmidt and F. P. Bowden, Dunn Nutritional Laboratory, University of Cambridge, England.

A new rickets-preventive was found in cholesterilene sulfonic acid, chemical relative of vitamin D, Prof. Lester Yoder, Iowa State College and Iowa Agricultural Experiment Station, announced.

A dietary factor which can prevent hemorrhage in chicks and may be a new hitherto unknown vitamin was found in seeds and cereals by H. Dam, of the Biochemical Institute, University, Copenhagen.

Tetany, severe nervous and muscular disease featured by painful muscular cramps and not to be confused with tetanus or lockjaw, can be cured or greatly relieved by treatment with "A. T. 10," a chemical fraction of irradiated ergosterol or vitamin D, Dr. I. Snapper, professor of medicine and general pathology, University of Amsterdam, reported.

A thermocouple that gives the temperature of air deep in the lungs by measuring the temperature of each breath was devised by Dr. Francis G. Benedict, director of the Boston nutrition laboratory of the Carnegie Institution.

Verification of the fact that the blindness-causing form of the tropical disease, onchocerciasis, is widespread in the Belgian Congo and that about one-third of the wild-flies, regarded as chief carriers of the malady, are infected with the disease was made by a Harvard University expedition under the direction of Dr. Richard P. Strong.

Azochloramide, new germicide and disinfectant that kills bacteria without injuring living tissues and does not break down in the presence of organic matter, was announced by Dr. Franz C. Schmelkes and associates of Wallace and Tiernan Research Laboratories, Belleville, N. J.

Physics

Radioactivity was created by an external cause for the first time when Prof. F. Joliot and Mme. Irene Curie-Joliot, Institute of Radium, Paris, bombarded boron, magnesium and aluminum with alpha particles with the result that positrons were given off after the bombardment was stopped.

Chemical proof of artificial transmutation was obtained by Prof. F. Joliot and Mme. Irene Curie-Joliot, Institute of Radium, Paris, as a result of their production of artificial radioactivity.

Artificial production of radioactive elements useful in medicine and superior in intensity to the rays of radium was predicted at the International Conference on Physics by Prof. F. Joliot and his wife Irene Curie-Joliot, who discovered the way to make many elements radioactive.

Carbon is made artificially radioactive when a delayed production of positrons is produced by bombardment with deutons accelerated with a million-volt tube, Prof. C. C. Lauritsen, R. Crane and W. Harper, California Institute of Technology, demonstrated.

Artificial radioactivity was produced in graphite (carbon) by bombardment with 600,000-volt protons with the production of positrons, Drs. J. D. Cockcroft, C. W. Gilbert and E. T. S. Walton, Cambridge, England, demonstrated.

Alpha particles are ejected from lithium at speeds greater than the swiftest radioactively produced alpha particles when lithium is bombarded with deutons, Cavendish Laboratory experiments showed.

A way to make common element sodium radioactive by artificial means,—and yield gamma radiation over twice as penetrating as that from natural sources—was discovered by Prof. Ernest Lawrence and Drs. Edwin McMillan and Malcolm C. Henderson at University of California.

On basis of experiments on bombarding heavy uranium with neutrons, Prof. Enrico Fermi, Italian physicist, predicted the early discovery of a whole series of radioactive elements lying between thorium and actinium in the periodic table.

Artificially produced gamma radiation having penetrating power equal to 3,500,000 electron-volts of energy was reported by Drs. C. C. Lauritsen and H. R. Crane, of California University.

A theory of the origin of the mysterious cosmic rays was advanced by Prof. F. Zwicky, of California Institute of Technology, and

Dr. W. Baade, of Mt. Wilson Observatory, which says the rays are caused by the sudden flare-up, or bursts of energy, from the type of star known as super-novae.

Cosmic rays were deflected by strong electric fields for the first time in the laboratories of Stuttgart University by Ernst Lenz, pupil of Prof. Erich Regener, world-famous cosmic ray authority, indicating that much of the radiation is corpuscular in nature.

For the first time the intensity of cosmic rays was found to vary with different times of the day, the maximum occurring at noon and minimum between 9 P. M. and 3 A. M., by Dr. Victor F. Hess, of the University of Innsbruck, working in the Tyrol Mountains, 7600 feet above sea level.

Partial annihilation of matter, the building-up process whereby heavier elements could be formed from atoms of hydrogen, is responsible for the formation of cosmic rays, Dr. R. A. Millikan declared.

While cosmic rays are now known to consist of a mixture of corpuscular particles and photons of light, the particle part of the rays accounts for from 90 to 98 per cent. of the total intensity at the top of the atmosphere, Dr. T. H. Johnson, of Bartol Research Foundation, estimated.

Plans were announced by Dr. A. H. Compton for extended cosmic ray research with small unmanned free-flight balloons which would transmit by radio the data being obtained in automatic instruments miles about the earth.

Cosmic ray measurements 820 feet below the surface of the Red Sea indicate that a large share of cosmic radiation consists of electrical particles, contends Prof. W. F. G. Swann, of Bartol Research Foundation.

Radiation resembling cosmic rays but less penetrating is thrown out by the tops of thunderstorm clouds, Dr. B. F. G. Schonland, South African physicist, reported.

Hardest cosmic rays so far discovered (penetrating more than 800 meters or 2620 feet of water) were discovered by Dr. Axel Corlin, University of Lund, Sweden, through experiments in an iron mine.

The formation of positrons from cosmic or gamma rays received support from calculations by Drs. W. Heitler and F. Sauter, of Bristol and Berlin.

Cosmic rays are charged particles, not radiation, Drs. A. H. Compton and R. J. Stephenson, University of Chicago, concluded on

the basis of cosmic ray meter records of the Settle-Fordney stratosphere eleven-mile-high flight.

Evidence accumulated that a trinity of particles—neutron, positron and electron—compose all the matter of the universe.

Following Dr. R. M. Langer's and Dr. Carl Anderson's early prediction, renewed suggestions that there exists a new atomic particle—the negative proton—were advanced by Dr. S. Tolansky, of the Imperial College of Science, London, and Prof. G. Gamow, of the Polytechnical Institute, Leningrad, U. S. S. R.

A new atomic particle—a double-weight neutron—was suggested by Dr. M. A. Tuve, of Carnegie Institution in Washington.

Experimental proof of conversion of radiation (cosmic or gamma rays) into matter (electrons or positrons) was questioned by Dr. Carl D. Anderson, California Institute of Technology, who holds that when lead or aluminum is bombarded rays merely knock out particles already existing in atomic nuclei.

A new source of protons for atomic bombardments, consisting of an electric arc operating in hydrogen at low pressure between an incandescent filament and a metal electrode, was devised by Drs. Edward S. Lamar and Overton Luhr, Massachusetts Institute of Technology.

Fast electrons, as well as cosmic and gamma rays, may give rise to pairs of negative and positive particles when they hit nuclei of atoms, Dr. D. Skobeltzyn, Leningrad, found.

Prof. Enrico Fermi, of Italy, discovered the type of artificial radioactivity in which a negative electron or beta particle is liberated—as contrasted with the liberation of the positron in the Joliot experiments—by bombarding elements with neutrons.

That the half-life or rate of decay of artificial radioactive materials is different for the same substance when produced in different ways was shown by the experiments of Drs. C. C. Lauritsen, R. Crane, and W. Harper, California Institute of Technology, who found that, when they turned carbon into nitrogen by bombarding it with deutons, the half-life of the material was different from the nitrogen made by the Joliots in Paris by bombarding carbon with alpha particles.

The positron is the shortest lived thing in the universe and dies when absorbed by matter as predicted by the Dirac theory, Prof. F. Joliot and Prof. Jean Thibaud, French scientists, determined independently.

Using instruments counting individual photons of light, Swiss scientists, Edgar Meyer, M. Schein and B. Stoll have been able to detect a new band of invisible light in the ultraviolet in the region from 2400 to 1900 Angstrom units.

By free-flight balloon ascensions Prof. Erich Regener, of the Physical Institute of Stuttgart, Germany, indicated that 70 per cent. of the ozone is below 19.5 miles altitude, much lower than the height previously supposed.

Invention by Prof. G. R. Harrison, of Massachusetts Institute of Technology, of two devices for measuring and analyzing complicated spectra are: (1) a wavelength computing machine which automatically prints wavelengths and intensities with all correction factors directly on a photographic plate, and (2) an interval sorter which performs and sorts 50,000 subtractions of wave numbers per minute.

Analysis of the observations made by American investigators during the Polar Year indicates that the temperature of the region from 62 to 124 miles above the earth is probably in the neighborhood of 80 degrees Fahrenheit.

Small periodic variations in the measurements of the velocity of light were found in the course of extensions of Michelson's experiments at Mt. Wilson Observatory, which gave a new average value, 299,774 kilometers per second, but these were attributed not to a real variation in light's speed but to other undiscovered causes.

A new theory of relativity developed by Sir Shah Sulaiman, distinguished mathematician and justice at Allahabad, India, links the classical mechanics of Isaac Newton with results predicted by Einstein's relativity.

"Photographs" of atoms magnified, in effect, 200,000,000 times obtained by the use of X-rays were exhibited by Prof. A. H. Compton and Dr. E. O. Wollan, of the University of Chicago.

X-ray studies of the structure of wood fibers reveal that even, soft tone accompanies the non-orientation of the wood fibers in the maple back of a violin, Dr. K. Lark-Horovitz and W. I. Caldwell, of Purdue University, have discovered.

Heat-absorbing glass which removes 52 per cent. of the "hot" but invisible infrared rays and which is expected to prove useful for skylight in southern factories during hot summer months, was reported by Dr. Roger S. Estey, physicist of the Electrical Testing Laboratories, New York City, to the Optical Society of America.

Sextants and binoculars can be improved for use under certain light conditions by attaching polarizing prisms, Dr. E. O. Hulburt, Naval Research Laboratory, found.

A precise value for the velocity of sound, 1087.13 feet per second at zero degrees Centigrade, was announced by Dr. Dayton C. Miller, Case School of Applied Science, who computed data from big gun firing just after the close of the World War.

By firing a gun into the barrel of a similar gun, Dr. C. Ramsauer, German physicist, developed a method of producing high pressures and high temperatures simultaneously.

The Raman effect of heavy water (containing hydrogen isotope mass two) is different from that of ordinary water, Dr. R. W. Wood, Johns Hopkins University, found.

Production of clear crystals of lithium fluoride transparent to 900 Angstrom units in the ultraviolet and with practically no variation in dispersion over visible spectrum, have been developed as a practical optical material in large sizes by Prof. D. C. Stockbarger, of Massachusetts Institute of Technology.

And it is fortunate that in the "bright lexicon" of Science there is no such word as *compromise*—either with time or truth.

IVOR GRIFFITH.

Sterilization of Sodium Diethylbarbiturate Solutions. C. J. T. Madsen. *Dansk. Tids. Farm. 8,* 62 (1934). Through *Chem. Abst. 28,* 6521 (1934). A 10 per cent. solution of sodium diethylbarbiturate after 60 minutes at 100 degrees loses 2.5 per cent. by decomposition to diethylacetylurea and the original pH of 10.1 falls to 9.3. Diethylacetylurea forms $CH(C_2H_5)_2COOH$ and urea, and the latter gives off CO_2 and NH_3. The rate of decomposition is decreased by decrease in pH. A 10 per cent. solution of sodium diethylbarbiturate, pH 8.9, after 60 minutes at 100 degrees loses 1.5 per cent. by decomposition.

ORIGINAL ARTICLES

THE MEDICAL WORKS OF MAIMONIDES AND HIS TREATISE ON PERSONAL HYGIENE AND DIETETICS

By Louis Gershenfeld, Ph. M., B. Sc., P. D.

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MOSES MAIMONIDES, the Hispano-Jewish philosopher, theologian, physician and astronomer, known as Rabbi Moses ben Maimon, and (Rabbi M. b. M., hence) Rambam, often called the Second Moses and known under other names with various honorary titles was born in Cordova, Spain, on March 30, 1135; died in Egypt on December 13, 1204; and was buried in Tiberias, Palestine. This year marks the octocentennial of the birth of this most interesting character who is regarded as the greatest of Medieval Jewish writers, thinkers and scholars. His fame as a distinguished and the most rational physician of the Middle Ages was, however, overshadowed by his famous reputation as a philosopher and Talmudist.

Maimonides practiced medicine with religious fervor as if the medical art was a holy calling. He himself tells us that the purpose of medicine: "Was to teach humanity the causes of ill health, the correct dietetic hygiene, the methods of making the body capable of useful labor, how to prolong life, and how to avoid disease. It thus directly elevates the human being to a higher moral plane where the pursuit of Truth is possible and where the happiness of the Soul is attainable." Those interested in preventive medicine can gather much of interest in Maimonides' writings, for hygiene (and especially dietetic hygiene) is a topic discussed freely and frequently in many of his works. He was a staunch advocate of the guarding against rather than the curing of disease.

His extensive medical knowledge was sought by the court and the general population alike. He was admired by the elite, worshipped by the masses, and was the favorite of royalty and the idol of their subjects. In one of his letters written in 1199 to his disciple Samuel ibn Tibbon advising him not to visit him at that time, he gives a vivid picture of his professional duties which required all

of his time, day and night, so that he had but little freedom for himself, even for his meals. In spite of these duties, he still fulfilled the functions of Chief Rabbi or Nagid and wrote "Responsa" addressed to all parts of the world. His energy was invincible. The following extracts from this letter are of interest: "Now God knows that in order to write this to you I have escaped to a secluded spot, where people would not think to find me, sometimes leaning for support against the wall, sometimes lying down on account of my excessive weakness, for I have grown old and feeble. I dwell at Fostat and the Sultan resides at Cairo. These two places are two Sabbath days' journey (about one mile and a half) distant from each other. My duties to the Sultan are very heavy. I am obliged to visit him every day, early in the morning; and when he or any of his children, or any of the inmates of his harem, are indisposed I dare not quit Cairo, but most stay during the greater part of the day in the palace. It also frequently happens that one or two of the royal officers fall sick, and I must attend to their healing. Hence, as a rule, I repair to Cairo very early in the day, and even if nothing unusual happens, I do not return to Fostat until the afternoon. Then I am almost dying with hunger. I find the antechambers filled with people, both Jews and Moslems, nobles and common people, judges and bailiffs, friends and foes—a mixed multitude, who await the time of my return. I dismount from my animal, wash my hands, go forth to my patients, and entreat them to bear with me while I partake of some slight refreshment, the only meal I take in the twenty-four hours. Then I attend to my patients, write prescriptions and directions for their various ailments. Patients go in and out until nightfall, and sometimes even, I solemnly assure you, until two hours and more in the night. I converse with and prescribe for them while lying down from sheer fatigue, and when night falls I am so exhausted that I can scarcely speak. In consequence of this, no Israelite can have any private interview with me except on the Sabbath. On that day the whole congregation, or at least the majority of the members, come to me after the morning service, when I instruct them as to their proceedings during the whole week; we study together a little until noon, when they depart. Some of them return, and read with me after the afternoon service until evening prayers. In this manner I spend that day. I have here related to you only a part of what you would see if you were to visit me."

All of his medical writings were written in Arabic. Though these contain summaries, classifications and elaborations of Galen's writings derived in the main from the standard Arabic Galenism of his day (from such authors as al-Razi, al-Tamīmī, Ibn Sīna, Ibn Wāfid, 'Ali ibn Ridwān and Ibn Zuhr), they are tempered with his own critical knowledge gained through his extensive experience by direct observation and by actual experimentation. His most popular medical work generally spoken of as Moses' Aphorisms or Moses' Medical Aphorisms or Principles was the Kitāb al-fusūl fī-l-tibb or Fusūl Mūsā, (known in Hebrew as Pirqe Mosheh), written about 1187-1190. It is a collection of 1500 aphorisms extracted from Galen's writings together with forty-two critical remarks. Galen's thoughts were classified in twenty-four chapters devoted respectively to: Chapters (1-3), anatomy, physiology, general pathology; (4-6), symptomatology and diagnosis, with special reference to the pulse and urine; (7) etiology; (8-9) general and special therapeutics; (10-11) fevers and crises; (12-14) bloodletting, cathartics, emetics; (15) surgery; (16) gynecology; (17) hygiene; (18) gymnastics, massage, etc.; (19) bathing; (20) dietetics; (21-22) drugs; (23) Galenic ideas which are often misunderstood; and (24) rare cases. In a final chapter (25), the author outlines a general criticism of Galenic medicine and philosophy, indicating some forty topics about which Galen contradicted himself. It ends with a discussion of Galen's teleological ideas from the Biblical standpoint. This last chapter, the most important of the work, was apparently unfinished at the time of Maimonides' death, as it was edited posthumously by the latter's nephew Yūsuf ibn 'Adallāh Abū-l-Ma'ālī, in 1204-1205.

Next in popularity only to the Fusūl was the Maqāla fī-tadbīr al-sihha known popularly as the Tadbīr al-sihha, which is composed of four books on diet and personal hygiene and was addressed about 1198 to al-Mālik al-Afdal Nūr-al-dīn 'Alī, Saladīn's eldest son. The latter suffered from fits of melancholia, and requested from Maimonides, his chief physician, a regimen. This work, a compilation obtained from ancient and Arabic writings and published first in Hebrew in the Journal "Kerem Hemed" (III, 9-31), is divided into four parts, as follows: (1) explanations of the case, and general hygienic and dietetic rules, with frequent references to Hippocrates and Galen; (2) easy remedies for use while traveling, or

when a physician is not available; (3) hygiene of the soul; psychotherapeutic rules partly derived from Aristotle and from al-Fārābi; (4) summary of hygiene and dietetics in the form of seventeen aphorisms. His Maqāla fīl-l-bayān al-a 'rād (Discourses on the Explanation of Accidents) regarded by some as the continuation of section five of his work on diet, was written for the same prince al-Afdal, who was then residing at Riqqa in Upper Egypt. This work known in Hebrew as Teshubot 'al she' elot peratiyyot and in Latin as De causis accidentium apparentium is divided into twenty-two chapters. Written about 1200, it apparently was Maimonides' last medical effort. Therein are contained many prescriptions, formulas of other physicians, with his own criticisms gently expressed; and prescriptions by himself follow which are of interest because of their simplicity and medicinal value.

His work on poisons and antidotes, Kitāb al-sumūm wal-mutaharriz min al-adwiya al-qitālah, was written in 1199 for and at the request of the vizir al-Qādī al-Fādil, and is also known as the Risālat al-fādilīyya. It was translated into many languages. The Latin translation known as De venenis (or contra venena) was a text extensively used by fourteenth century physicians. The Hebrew translation is known as Ha ma'amar ha-nikbad (or Ha-ma'amar beter'iaq). This work, a compilation of all that was known about the subject treated, is divided into two sections, preceded by an introduction, the latter explaining al-Fādil's efforts to obtain from many distant countries all the ingredients needed to prepare the great theriaca. Section I divided into four parts deals with the venomous stings of insects (scorpions, spiders, bees, wasps, snakes, etc.), the biting of mad dogs, and the treatment of such wounds. He points out the great length of time of the incubation period of rabies, and he states that the bite of a mad dog is to be feared whereas that of a healthy dog is of little importance. Section II, divided into six chapters, deals with vegetable and mineral (mainly internal) poisons (such as verdigris, arsenic, litharge, opium, henbane, and other solanaceous herbs, mushrooms, etc.), and their antidotes. The clinical description of some cases of poisoning are very interesting. In this work, Maimonides constantly mentions the necessity for ligation and suction of wounds. Here in part are directions which he gives for the treatment of poisoned wounds: "The first thing to do is to apply a tight band above the bitten part so as to prevent the poison gaining entrance to the body. While this is being done, an assistant should

make incisions in and about the wound, and then, after rinsing one's mouth with oil, or with oil and wine, the wound should be thoroughly sucked, being careful to spit out everything taken into the mouth. He who so sucks the wound should have no sore places in the mouth, nor any carious teeth. Should sucking be impossible, cupping may be resorted to."

Two treatises, short and long texts, were written by Maimonides on coitus and on the hygienic aspects of sexual intercourse. This work, the Maqāla fī-l-jimā' was dedicated to al-Muzaffir I, (Ayyūbid) Sultān of Hamāt (1178-1191), nephew of Saladin. The Hebrew translations are known as Ma'amar 'al ribbui ha-tashmish and Ma'amar ha-mishgal. The longer text is divided into nineteen chapters and deals with differences in sexual temperament, the use and danger of sexual intercourse, abstinence, aphrodisiacs and anaphrodisiacs, narcotics, etc. Regarded as an authority during his day, and an advocate of sexual intercourse, the following extracts are of interest. "When erection," he said, "occurs in a natural and unconconscious manner, and when after directing one's thoughts towards other subjects one feels the erection persist, and if there is a sluggish sensation in the regions of the kidneys, and the cords of the testicles are tightened and the flesh is warm, then one needs to have sexual intercourse and it is hygienic to perform the act." He states further that "Copulation is life; strength to the body, and light to the eyes. But when one abuses it, the body is consumed in it vigor and life is crushed. Solomon has well said in his wisdom: 'Give not your strength to woman'."

The Maqāla fi-l-rabw (a work on asthma), written about 1190 contains thirteen chapters dealing with diet and climate in general, with a discussion of the climate and food of different countries, particularly of Egypt. The best diet and climate for asthmatics follow. His treatise on hemorrhoids (Maqāla fī-l-bawāsīr), known in Hebrew as Ha-ma'amar bi-refu'at ha-tehorim, is composed of seven chapters. He ascribed hemorrhoids to bad digestion, mainly to constipation, and advocated a light diet, predominantly vegetarian. He mentioned the danger of bloodletting and of surgical intervention, which he says should be reserved for extreme cases.

A collection of extracts from Galenic writings, the Mukhtasarāt (abridgments, digest) (lost in its original Arabic but available in Hebrew translations) and a commentary on Hippocrates' Aphorisms

are to be found among his medical works. Other medical writings ascribed to him are the Sefer-refu'oth (Book of remedies or medicines) in Hebrew, and the Kitāb al-asbāb wal-'alāmāt (Causes and symptoms) in Arabic. It is of interest to note that in his many writings on methods of treatment he reveals a marked opposition to polypharmacy (complicated mixtures of medicaments). He recommends only simple remedies and would only use drugs which he himself tested or which had been found satisfactory and in turn recommended by recognized medical authorities. "In minor ailments," he wrote, "Nature cures the body without the need of medicinal remedies, if the patient only follows certain dietetic regulations. Where, however, the services of a physician are required, he should see to it that he aids Nature in her beneficial course. Most of the doctors err in their treatment. In endeavoring to assist Nature, they weaken the body with their prescriptions."

The physician's prayer, ranking as it does with the oath of Hippocrates (matching the latter and completing it from the Jewish viewpoint), has been widely circulated and is a valuable contribution to medical deontology. It is ascribed to Maimonides and is most frequently known as Maimonides' prayer. However there is no genuine proof that this was composed by Maimonides though many regarded it as Maimonidean in tone and spirit.

This prayer for physicians follows:

The Oath and Prayer of Maimonides

"Thy Eternal Providence has appointed me to watch over the life and health of Thy creatures. May the love for my art actuate me at all times; may neither avarice, nor miserliness, nor the thirst for glory, nor for a great reputation engage my mind; for the enemies of Truth and Philanthropy could easily deceive me and make me forgetful of my lofty aim of doing good to Thy children.

May I never see in the patient anything but a fellow creature in pain.

Grant me strength, time, and opportunity always to correct what I have acquired, always to extend its domain; for knowledge is immense and the spirit of man can extend infinitely to enrich itself daily with new requirements. Today he can discover his errors of yesterday and tomorrow he may obtain a new light on what he thinks himself sure of today.

O God, Thou has appointed me to watch over the life and death of Thy creatures; here I am ready for my vocation.

And now I turn unto my calling:
O stand by me, my God, in this truly important task;
Grant me success! For—
Without Thy loving counsel and support,
Man can avail but naught.
Inspire me with true love for this my art
And for Thy creatures,
O, grant—
That neither greed for gain, nor thirst for fame, nor vain ambition,
May interfere with my activity.
For these I know are the enemies of Truth and Love of men,
And might beguile one in profession
From furthering the welfare of Thy creatures.
O strengthen me.
Grant energy unto both body and the soul
That I might e'er unhindered ready be
To mitigate the woes,
Sustain and help
The rich and poor, the good and bad, enemy and friend,
O let me e'er behold in the afflicted and suffering,
Only the human being."

Treatise on Personal Hygiene and Dietetics

The Tadbīr al-sihha or Maimonides' work on personal hygiene and dietetics previously mentioned is of interest from many viewpoints. Therein, with bitter sarcasm and much irony he deplores the low and degraded state of the medical profession during his time and the apparent success of various charlatans and bragging healers. He stresses the necessity and importance of a detailed and thorough professional training for medical practitioners and also the need of careful personal attention to one's patients. Details are given concerning the relation between the patient and his physician and vice versa. Of interest is his statement that slight indispositions may, whenever possible, be treated without any special help of physician or drugs; but a catarrh he warns must not be taken too lightly. Though Galen and Hippocrates are frequently quoted in this work, he gives his own views on personal hygiene and dietetics which are of interest. Here follow excerpts from the first chapter which deals with the promotion of health in general. I am indebted to Dr. Solomon L. Skoss, professor of Arabic at Dropsie College in Philadelphia for the following translation from the Arabic original of the excerpts in this treatise, which original was edited with a German translation by

Rabbiner Dr. H. Kroner and published in "Janus", Vol. XXVII-XXIX (reprint Leiden, 1925).

The author states: "The purpose of this chapter is to set down certain rules which are easy to observe, yet very useful for the preservation of health. They are generally followed by the best physicians. In them one recognizes the principle of Hippocrates: 'Continuation of good health depends on being careful of over-eating and of sluggishness.' His whole theory of health is thus condensed into two brief rules: 'A man should not eat too much, nor should he give up exercise.' It is so, for over-eating, i. e., eating to the point of aversion, results in over-stuffing the stomach and stretching it; and when an organ is unduly stretched out, its joints become loose and it gets rather weak. The stomach, therefore, is unable to digest this mass of food properly; and the consequence is general sluggishness, laxity of movement, and over-loading with food, especially when followed by excessive drinking which necessarily brings about to oversatiation. It may result either in a serious digestive disturbance which may be fatal or in a lighter disturbance causing indigestion and other diseases, all depending on the kind of food and susceptibility of the organs to various diseases. When food is poorly digested in the stomach, the second digestion in the liver, as well as the third digestion in the organs (1) is likewise bad, and this in turn helps to develop various kinds of disorders. Hence the statement of Galen: 'Whoever wishes to keep healthy shall endeavor to avoid poor digestion and not move around too much after meals."

"In view of the great injury of over-satiation all physicians warn against it, insisting that a person should restrain himself from eating when he has not yet fully satisfied his appetite, thus avoiding the overloading and stretching out of the stomach. All physicians agree that partaking of a small quantity of food of inferior quality is less injurious than consuming an excessive quantity of food of superior quality. In the former case, though the appetite is not entirely satisfied, the food is thoroughly digested and the entire body gets the benefit of whatever nourishment it contains, thus strengthening the eliminating forces to throw off the bad portions of this food with little or no injury to the partaker. However when an excessive quantity of food is consumed, be it even carefully prepared bread and the choice of meat, it could not be thoroughly digested, as we have mentioned above.

(1) The author probably means by that the assimilation of food in the body.

"With the view of avoiding over-eating, the physicians advise against partaking of many kinds of foods at one meal; but my belief is that one should limit the meal to one kind of food only, so that the food consumed will not be in too big a quantity.

"In warm weather it is advisable to consume less food, for digestion is rather poor during the summer on account of the loosening of the innate heat; but when the temperature grows colder one should increase the consumption of food, for digestion is strengthened in winter, the natural heat being preserved on account of closed up pores, and the appetite growing stronger."

"If a person took as good care of himself as he does of his domestic animal, he would avoid many diseases. No one throws food to his animal without measure, but he feeds it in accordance with its needs; yet he himself consumes food without any measure or control. One should also take into consideration the moving around of domestic animals and the exercise they get lest they become stiff and perish. He, however, does not do that with himself and neglects exercising his body which is the greatest support of good health and a ward against many diseases.

"We have mentioned the saying of Hippocrates: 'Continuation of good health depends on being careful of sluggishness.' Indeed, there is not a thing that could take the place of exercise; for with exercise the natural heat gets inflamed and all waste matter is thrown off, whereas inertness extinguishes the fire of the natural heat, and the superfluities of the body are not thrown off, 'but not every movement of the body is considered by physicians as exercise.' Only a vigorous or quick movement, or both combined, could be termed exercise. It is with the vigorous movement resulting in change of breathing that the person begins to breathe deeply. A movement stronger than that brings about a fatigue, i. e., a very strong exercise causes fatigue, which not everyone is able to stand, and there is no particular necessity in that, the most beneficial for the preservation of health being the brief exercise.

"One should exercise on an empty stomach only, and after the excrements are thrown off (urine and bowels). Likewise, exercise should be avoided in excessive heat and excessive cold; the best time for it is early in the morning, after one gets up from his sleep and throws off the excrements. To the general principles for the preservation of good health, promulgated by Galen, belongs the following: 'Just as movement before eating is altogether beneficial, so is

movement after eating quite injurious.' By this is meant the avoidance of heavy exercise after eating, as well as coitus and bath, which are very harmful, especially to those who naturally have thin and narrow veins. Yet it is advisable to move around lightly after meals from one end of the room to the other until the food is well settled in the stomach and rests there until digested. Sleep helps digestion, especially with those who are in the habit of sleeping in the daytime.

"One of the principles of health preservation is that one should avoid eating soon after he has already eaten, but rather wait until he gets really hungry, the stomach empty and the saliva accumulating in his mouth. When one is truly hungry, then is the time for a beneficial meal. Neither should one drink unless he is really thirsty. As soon as hunger or thirst is felt one should wait a while for there is a false feeling of hunger, as well as of thirst, due to a bad moisture that irritates the opening of the stomach. If this feeling subsides no partaking of food is then necessary. If, on the other hand, it increases, one should forthwith satisfy his hunger or thirst. Drinking right after the meal is injurious and interferes with digestion, unless one is used to it. It is neither advisable to drink during the meal, nor after it, as long as the food is in the stomach, anything but pure cold water, with no admixture to it.

"Another principle for the preservation of health is that one should not administer a clyster for the purpose of removing the residue in the stomach, unless there is special need in its removal, in which case one must proceed with it forthwith. It is then advisable to eat, take a bath, have coition, sleep and exercise before one is examined and the residue is removed from the stomach. One should also be examined after he has done one of the five things enumerated here.

"An important rule is to examine the quality of food. One could write a very long chapter on this subject in which a knowledge of the nature of the various kinds of foods would be essential. Physicians have written many long treatises on this subject on account of its very great need. However, for our present purposes we shall limit ourselves to foods most frequently found and commonly used, and describe their benefits.

"Superior foods which should be preferred by all who take care of their health are: well prepared wheat bread, meats of one- or two-year-old sheep, chickens, health cocks, partridges, pigeons, and also

yolks of hens' eggs. By well prepared bread is meant that it should be of fully ripened wheat after the superfluous moisture was dried in it, and it must not be too old as to be on the verge of deterioration or begin to sprout. The bread should also have bran, i. e., the husks must not be removed through a sieve; it must be well leavened, well salted, thoroughly kneaded, and baked in an oven. This is called by physicians well prepared bread, and it makes the best food.

"It should be noted that whatever is prepared of wheat besides this bread cannot be considered as good food at all. Indeed, among such preparations are very injurious foods, as unleavened bread, and cooked dough, as vermicelli, noodles (called by the Persians Tutmaj), and cooked floor as "'harira" (2) and "asida", (3) roasted (or fried) dough, such as sweet pancakes and bread moistened with olive oil or any other oil. All these are very bad foods for everybody. Likewise bread baked of white flour or fine flour, and meat and wheat pounded together cannot be recommended as good foods. If they are nourishing, when well digested, these foods require a strong stomach, and only then are they quite beneficial.

"As for the kinds of meat that we have mentioned above, not all of them have the same nature, neither could all be as equally recommended. The best kind of meat of cattle is that of sheep grazing in the mountains, one or two years old and moderately fat. The best part of the animal is the outside meat and the part adhering to the bones, that found in the abdomen being inferior in quality. Similarly all fats are bad, as they satiate, cause indigestion, diminish the appetite, and form a pituitary secretion. Also the head of animals contains more unassimilable matter than any other organ. On the other hand the shanks contain less of this matter and their use as food is not so bad. Lambs are again rich in refuse matter and there is not much good in them, while suckling kids are good to eat and easy to digest. Meat of fowl is generally lighter than that of cattle and is much easier to digest. The best fowl meat is that which is mentioned above.

"Fresh milk is a good food for those in whose stomach it will not sour nor ferment, nor form flatulence in the region below the loins. Galen recommends that one should add to the milk a little honey and a pinch of salt so as to avoid its curdling in the stomach.

(2) A soup of flour and milk.

(3) A gruel prepared of flour with butter and honey.

The best kind of milk is the tenderest, such as milk of goats, or of she camels which is also good. Whatever is prepared from milk or is mixed with it is very unhealthy, such as curdled milk, sweet and sour milk mixed together and whey. Likewise all that is cooked of milk and in milk is unwholesome as food. Cheese is a poor and heavy food, except the fresh white cheese which is sweet of taste and contains little fat. Galen praises it as a nourishing food. Other kinds of cheese are objectionable, especially the old cheese containing much fat. Fresh and melted butter is not a bad food for anybody.

"Bees' honey is beneficial for old people, but disliked by the young, especially of feverish nature, for it changes into yellow bile. Fish is mostly a poor food, especially for those who have a moist nature (phlegmatics) and old people, above all the fish that have large bodies, salted, as well as those frequenting slimy water, and fat, viscous fish. On the other hand, fish small of body and white of meat, which have acquired a sea taste, and those found in flowing water as e. g. the kind called mullet or sardines—are not unwholesome as food, yet should not be used too much.

"It is known among all physicians that the best of food is what is generally known as forbidden by the Moslem religion. It combines all the nourishing qualities of food, forming a good, rich, and light food which facilitates and helps digestion and rids the body of waste matter by discharging urine and perspiration. It has other superior qualities and many virtues enumerated by physicians. However, it is quite useless to talk about a food, the use of which is not permissible; we shall therefore refrain from mentioning the ways and manner of using it with regard to the preservation of one's health (4).

"Vegetables which generally are not wholesome as food are garlic, onions, leek (related to the onion), radishes, cabbage, and egg-plant; and people who take care of their health should avoid them. Cantaloup is easily digestible when eaten the first thing in the morning on an empty stomach, having no flow of bad secretion and not containing any bad mixture. It has then a slight cooling effect on the body, throws off the urine and cleans the veins of impurities, it being thus a wholesome food. I have mentioned it here, for it is used much by people.

(4) The author evidently refers in this paragraph to grape wine and various kinds of beer, the use of which is prohibited by the Moslem religion.

"In regard to fresh fruit it is well to know that whatever grows on trees cannot be generally recommended as food. Yet some fruit is not as bad as others: so carobs, fruit of the lotus tree, and the medlar are quite wholesome, whereas figs and grapes are not nearly so bad, in fact almost wholesome, as Galen speaks of figs and grapes as the chiefs to all fruit. They are indeed the least injurious, yet one should not overtax the blood which is required for digesting all fruit (i. e. one should not eat too much of this fruit). My statement that whatever grows on trees cannot be recommended as food must not be misunderstood in view of the fact that fruit juices as well as sirups and confections prepared from fruits are beneficial as medicine in various diseases, for the virtue of foods as food is different from their virtue as remedies for diseases; this is quite evident to those versed in the medical art.

"There is a statement of Galen in which he offers a solemn advice to people that they should not eat any fruit. He says that every year he used to suffer from fever, then, following his father's advice completely to abstain from eating fruit, and since then up to the time he wrote his treatise, he suffered from fever only one day. The fact that many people eat these fruits yet do not suffer from fever is no proof to the contrary, for change in habits and variety in dispositions bring about different rules. If the Hindu e. g. ate well prepared bread and mutton meat he would surely become ill, and on the other hand if one of us limited his diet to rice and fish as the Hindus do he would likewise become ill. However, the purpose of this treatise is not to cite the causes thereof, but its aim is that we know that generally speaking fruits are not wholesome and should be eaten in moderate quantity. They must not be mixed in any form with other foods. Fruits that act as laxatives, such as plums, grapes and figs are to be consumed before the meal which is to be taken only after the former is emptied from the stomach, whereas those that act as astringents as quinces and pears, should be taken after meals in moderate quantities, as much as to have their fragrance in the stomach. Just as figs and grapes are the best of fruits so are peaches and apricots the worst among them. The latter two cannot be digested at all, an appreciable quantity of waste matter remaining in the veins mixed with the blood, where it eventually boils, thus causing the inception of putrid fever.

"Dried fruits, such as raisins, dried figs, kernels of pistachio nuts, kernels of dry almonds, are not unwholesome; however they

are recommended as beneficial after meals, especially raisins and pistachio nuts which are very good for the liver; and 'A healthy liver is our life', as Galen said. In a similar manner it is good to take a little of sweet dessert after the meal in order to enable the tomach to envelope the food and digest it properly."

The previously mentioned excerpts from the first chapter appear here as such for the first time (I believe) in the English tongue translated from the original Arabic. They give the thoughts concerning personal hygiene and dietetics prevalent among the leading medical practitioners in the Arabic speaking countries during the twelfth century.

Maimonides' Triology

Brief comments here should be made of the three of his greatest works, a triology. Though they are included among his Rabbinical and philosophical writings, information concerning medical subjects are to be found therein. His first great work was the Sirāj (or Light or Maor (Hebrew)) or his Commentary on the Mishnah. "A physician," he says in this Commentary on the Mishnah, "should begin with simple treatment trying to cure by diet before he administers drugs." It is of interest to note that in his "Responsa" he applies this principle to spiritual ills as well. The following opinion voiced almost 800 years ago by Maimonides can be aptly applied today: "Like unto a murderer," he wrote, "is the physician who refuses to tender his assistance in time of necessity, or who practices without due study of the ailment which he is treating."

The Mishnah Torah or Double of the Torah (Repetition of the Law; Deuteronomy) or Strong Hand (YaD ha-Hazaqah) (Sefer ha-yad), (written in new Hebrew not Hebrew-Aramic) is the first complete digest, classification and codification of all the Mosaic and Rabbinical laws. It is enriched with much of his own philosophical and scientific thought and contains material derived by industrious work and compilation not only from the Torah and from both Talmuds, but also from the Geonim, the whole consisting of 1000 chapters being classified in fourteen books or sections. In this work, one finds the whole of Jewish jurisprudence, religious, civil and criminal, astronomical knowledge and medical information, coupled with a considerable amount of general data and philosophical thought. It is difficult to appreciate the significance of this masterful and gigantic work. Regarded by many as the greatest work in Jewish

literature after the Bible, it has obtained a semi-canonical status in Israel.

The most famous work written by Moses Maimonides and which crowned his reputation was the Dalālat al-Hā 'irin, or Guide for the Perplexed, or Moreh nebukim (Hebrew), (or Doctor perplexorum), completed in 1187-1190. Written in Arabic, the original text was given in Hebrew characters. Translations in French, Hebrew, Latin, Italian, German, Spanish and in English are available. A better translation of Dalālat is guidance and "A guidance for the perplexed" is what Maimonides intended this work to be. This treatise appeared in the form of letters addressed to his disciple Joseph ibn 'Aknin and was sent to him chapter by chapter as he completed them. It was not intended for the multitude or the masses but it was written from a philosopher to the philosophically inclined (to the select). He attempted to bring mental peace and spiritual comfort to the "perplexed" and the result was his "Guide". His purpose of this work was to reconcile faith with reason, to reconcile Aristotelian philosophy and thought with Jewish theology and the doctrines of Judaism. This was something new, something original, something never attempted before by any Jewish thinker. To some extent he championed science against the fundamentalism of the Bible, though he was at all times honest and consistent in the belief of the truth of the Aristotelian system and convinced of the truth of the Mosaic doctrine and of the Divine origin of the Torah. Though much can be said pro and con for this and other of his works, at least Maimonides must be credited with the fact that he pointed out that philosophy and science did not begin nor did it end in the Scriptures and Talmud.

PREPARATION OF TETRAHYDRONAPHTHALENE PEROXIDE *

By Wm. Nussle, Jr., G. W. Perkins and G. Toennies

(Contribution from the Organic Chemistry Laboratory of the Philadelphia College of Pharmacy and Science and the Lankenau Hospital Research Institute.)

IN connection with studies by one of us on the oxidation of cystine in non-aqueous media (1) it was thought desirable to compare the activity of tetrahydronaphthalene peroxide with that of other peroxides. Bamberger and co-workers prepared a number of tetrahydronaphthalene derivatives by reducing the corresponding naphthalene compounds with sodium in amyl alcohol solution. These hydrogenated derivatives are of two types, e. g., aromatic and alicyclic. In certain cases they noted that on standing the derivatives would darken in color (2). Bamberger and Kitschelt observed that tetrahydronaphthalene for which we will use the shorter name tetralin, when allowed to remain in contact with air for some time, underwent a slow change in color and exhibited chemical activity not found in freshly distilled tetralin. Hartman and Seiberth (3) found that tetralin and air at room temperature and higher (70 degrees-80 degrees) gave a peroxide with a melting point 53 degrees-54 degrees, and that the formation of the peroxide could be catalyzed by metals such as zinc turnings. Hock and Susemihl (4) and Piatti (5) have also observed the phenomena of oxygen absorption by tetralin. Several patents describe the preparation of tetralin peroxide both with and without catalysts (6). Moureu, Dufraisse and Chaux (7) in an investigation of autoxidation and knocking in motor fuels found that tetralin exposed to the air at room temperature gave a positive test for peroxide with potassium iodide solution.

We have investigated the method as used by Hock and Susemihl and find that certain factors are important for the successful oxidation of the tetralin to a peroxide. The general method employed by them was to aspirate air through a liter of tetralin at about 75 degrees C. for fifty to sixty hours. The unoxidized tetralin was then distilled off at 1-2 mm. pressure, the peroxide crystallized by chilling

*A portion of this paper is abstracted from a thesis presented by Wm. Nussle, Jr., in May, 1934, to the Faculty of the Philadelphia College of Pharmacy and Science in partial fulfillment of the requirements for the degree of Bachelor of Science in Chemistry.

the residue, with final recrystallization from petroleum ether. The peroxide has a melting point of 56 degrees C. They report a number of properties of the peroxide. We have varied the time of the aspiration and also the method of aspiration. The time factor seems to be of considerable importance, also an efficient condensing system is necessary to condense the tetralin from the moving current of air and return it to the reaction flask. A maximum oxidation time of 45.5 hours is the optimum time for good yields. The following table records some data observed on a series of runs.

	Initial volume of tetralin (d^{27} 0.9664)	Aspiration time	Final volume of oxidized tetralin	Density of tetralin at end of run	Primary yield of crude peroxide
1.	500 cc.	45 Hours	420 cc.	d^{20} 1.020	70 gm.
2.	1000 cc.	66.5 "	800 cc.	d^{23} 1.026	(a) viscous liquid
3.	1000 cc.	49 "	910 cc.	$d^{28.5}$ 1.000	(a) (b) viscous liquid
4.	500 cc.	44.5 "	(c) 485 cc.	d^{27} 1.012	70 gm.
5.	1000 cc.	45.5 "	840 cc.	$d^{27.5}$ 1.005	132 gm.

Notes: In the first four runs the air was distributed through the tetralin by means of a T-tube. In the last run the air was distributed by means of a small size alundun thimble. The first four runs were heated on a water bath and the last run heated in a deep tank both kept at 75° C. ± 2°.

(a) No peroxide could be crystallized from the viscous residue even though seeded with peroxide crystals and allowed to stand in the refrigerator for a week.

(b) The oxidation was interrupted at 44 hours and density found to be d^{22} 0.994. At the end of 48 hours the density was found to be d^{22} 0.9980.

(c) The color of the oxidized tetralin was orange-yellow when matched with Mulliken's Color Chart.

The fifth run was interrupted from time to time in order to make density measurements and also compare the change in color using a Lovibond Tintometer, at the same time the total volume was recorded.

Oxidation time elapsed	Volume of tetralin	Density	Lovibond average color tints Yellow	Red
0 Hours	1,000 cc.	d^{27} 0.9664	.78	.17
11 "	990 cc.	d^{24} 0.9775	1.4	.35
18 "	980 cc.	d^{28} 0.9806	1.5	.47
25.5 "	950 cc.	d^{27} 0.9868	2.4	.65
30.5 "	930 cc.	d^{23} 0.9903	3.9	.87
37 "	870 cc.	d^{22} 1.0004	5.7	1.3
42.5 "	860 cc.	d^{24} 1.0027	7.2	1.6
45.5 "	840 cc.	$d^{22.5}$ 1.005	7.7	1.7

The apparatus set-up and general procedure followed for obtaining the peroxide was as follows:

1000 cc. of tetralin were placed in a 2-liter flask to which was fitted a three-holed cork holding a long Allihn condenser, a thermometer and an inlet tube for air at the bottom of which was fitted an alundun thimble. The thermometer and the alundun thimble were both immersed in the tetralin. The top of the condenser was corked and fitted with tubing, and by means of glass stopcocks and a by-pass for air it was possible to operate a laboratory motor-blower continuously without heating and only aspirate from 10 to 12 liters of air per hour through the tetralin. The air before entering the inlet tube of the reaction flask was drawn through sodium hydroxide, sulfuric acid and calcium chloride. The tetralin was kept at 75 degrees C. approximately (from 73 degrees to 77 degrees C.) by carefully "cracking" the valve of the steam coil. At the end of approximately 45 hours oxidation time, the tetralin was transferred to an all glass vacuum distilling apparatus with ground joints. The unoxidized tetralin was distilled off at as low a pressure as possible so that the peroxide would not be decomposed by heat. The tetralin distills at 47.2 degrees to 51.2 degrees C. at 1 to 1.5 mm. pressure. At 4 mm. pressure the tetralin distills at 62.0 degrees C. The liquid remaining in the distilling apparatus was placed in a Frigidaire Cabinet at —15 degrees to —20 degrees C. overnight and the crystals of peroxide which crystallize out were filtered through a sintered glass filter.

In order to obtain a product melting sharply at 56 degrees C. it is necessary to recrystallize several times. The best solvent for the recrystallization was found to be a mixture of ethyl acetate and petroleum ether. 70 grams of the crude peroxide were dissolved in 22 cc. of ethyl acetate to which was added 70 cc. of petroleum ether, this solution was then allowed to stand overnight at —10 degrees C. and 40.5 grams of peroxide crystallized out. Two additional recrystallizations were made using the same ratio of solvents and peroxide. The final yield of pure peroxide melting at 56 degrees C. was 23 grams (from 70 grams of crude peroxide).

Summary

To obtain satisfactory yields of tetrahydronaphthalene peroxide by the oxidation of tetrohydronaphthalene (tetralin), the oxidation should not be continued as long as that reported by Hock and Susemihl but should be stopped at about 45 hours time when the density of the tetralin has increased to approximately 1.000 at 22.5 degrees

C. It was not found possible to isolate the tetralin peroxide from the oxidized tetralin when longer oxidation times were used.

The best solvent for the recrystallization of tetralin peroxide was found to be a mixture of 22 cc. of ethyl acetate and 70 cc. of petroleum ether for each 70 grams of the peroxide. Tetralin peroxide recrystallized three times from this solvent mixture melted at 56 degrees C.

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Report on Hypophosphites. Henry R. Bond. *J. Assoc. Official Agr. Chem. 17,* 437 (1934). The assay method of the N. F. V for the hypophosphites of calcium, manganese, potassium and manganese produced inconsistent results in regulatory work. Determinations based upon the oxidation of hypophosphites to phosphates with subsequent precipitation of the phosphate were found to be satisfactory. Methods based upon the reduction, by the hypophosphite, of mercuric chloride to mercurous chloride were as yet unsatisfactory but showed promise.

A collaborative study of the determination of calcium and hypophosphite in syrup of calcium hypophosphite N. F. indicates that excellent results are obtained if the hypophosphite is oxidized with nitric acid, precipitated with ammonium molybdate reagent and subsequently converted to $Mg_2P_2O_7$. Calcium is determined by precipitation as the oxalate and subsequent conversion to $CaSO_4$. Tentative methods of assay are given.

VOLATILE OIL OF ACHILLEA MILLEFOLIUM LINNÉ

By R. L. McMurray*

Constants of the Volatile Oil

A CROP of *Achillea Millefolium* Linné grown at the Pharmaceutical Experiment Station at the University of Wisconsin during the summer of 1929 was steam distilled to obtain the volatile oil. About 235 cc. of oil were obtained: the weight of the crop was not available, and therefore the percentage yield for the volatile oil was not calculated. The following constants were obtained at 25 degrees C.:

Specific gravity	0.9066
Refractive index	1.4703
Specific Rotation a(D)	—14.11

The specific rotation was determined on the following dilutions in 95 per cent. alcohol. Determinations were made on 9.3853, 4.1634 and 3.3701 grams of volatile oil respectively per 100 grams of solution and using a 50 mm. tube. H. Haensel (1) states he used absolute alcohol. Dilution of the volatile oil is absolutely necessary because of the intense blue color.

H. Haensel (1) states that a solution of one part of oil to 200 parts of absolute alcohol, when measured in a 50 mm. tube, rotates the plane of polarized light 1.65 (degrees) to the left. A duplicate of Haensel's method was made, using a 100 mm. tube, but the value that he reported was not obtained. Instead an average reading of 0.053 degrees, equivalent to a(D) —11.76 was noted. Considering the extreme dilution this reading is in agreement with the readings obtained by using larger percentages of the volatile oil. Further, the rotating power obtained by A. B. Aubert (2) (—14.2 degrees) is in agreement with present results. Therefore, it may be concluded that the optical rotation value reported by H. Haensel is in error.

Early History of the Volatile Oil

The earliest recorded production of the volatile oil from *Achillea Millefolium* Linné yet found is that by F. Hoffman (3) in 1719. He states that a blue volatile oil was obtained by distillation. K. Neumanns (4) in 1752, also refers to a blue volatile oil. W. Lewis, (5) in 1753, likewise, refers to a blue volatile oil.

L. F. Bley (6) has been given credit (7) for first producing this volatile oil in 1828. On the contrary he was not the first, as

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at least one of these workers referred to above undoubtedly obtained the volatile oil of *Achillea Millefolium* Linné more than a century before the publication of Bley's work.

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Determination of Citric Acid as Pentabromoacetone and Its Application to Wine. O. Reichard. *Z. Unt. Lebensm. 68*, 138, (1934). Through *Analyst, 59*, 759 (1934). The conditions for the quantitative conversion of citric acid in aqueous solution into pentabromoacetone have been established. The treatment with potassium bromide, sulphuric acid and potassium permanganate must be carried out at a temperature not higher than 5 degrees C., and bromine must be present in such quantity that the ratio bromide: citric acid is not less than 2, and the ratio potassium bromide: citric acid not below 3. The amount of potassium permanganate present must produce a persistent violet color or a separation of manganese dioxide. After being washed with water, the collected pentabromoacetone is dried for 2 hours in a desiccator over sulphuric acid. It may be identified by the melting-point (71 degrees to 72 degrees C. for the crude, and 73 degrees C. for the purified product), the crystalline form, the color reactions with resorcinol and phloroglucinol, and, after decomposition by alkali, by the iso-nitrile reaction.

In the amounts occurring in wines, glycerol and such organic acids as malic, lactic, tartaric and acetic acids do not interfere with the determination, provided that the above conditions are fulfilled; preliminary separation of the citric acid is usually unnecessary. The presence of more than 5 grams of sugar per liter renders direct bromination of the citric acid impracticable. In this case either the sugar is first fermented away or the citric acid is precipitated as barium salt, which is washed wth 50 per cent. (by vol.) alcohol and subsequently brominated. Details are given of the procedure to be followed in the various cases.

SCIENTIFIC AND TECHNICAL ABSTRACTS

Compiled by Arthur Osol, Ph. D.

The Absorption and Storage of Vitamin A in the Rat. C. A. Baumann, Blanche M. Riising and H. Steenbock. *J. Biol. Chem. 107,* 705 (1934). The apparent importance of vitamin A reserves for the well being of the animal has led the authors to make a detailed study of the absorption and storage of the vitamin, the rat being used as the experimental animal. Vitamin A determinations were made on the unsaponifiable extracts by means of the Carr-Price technique (*Biochem, J., 20,* 497, 1926) using a solution of $SbCl_3$ in $CHCl_3$, saturated at 0 degrees, as reagent. The results were calculated according to the method of Moore (*Biochem. J., 24,* 692, 1930). Analyses for vitamin A when added as halibut liver oil to rat tissues or extracts of rat tissues gave values ranging from 95 to 104 per cent. of the amount added. The method therefore appeared sufficiently accurate. Occasionally the colorimetric results were verified by means of spectrophotometric determinations. The following summary is given:

(1) As measured by the $SbCl_3$ test, 95 per cent. of the total vitamin A of the rat was found stored in the liver. The remainder was located in lung and in kidney tissue. On the authors' regular stock ration only traces of vitamin A were found in rats under three weeks of age; thereafter the increase in the stores was rapid and regular.

(2) The vitamin A content of new born rats was increased slightly by raising the vitamin A intake of the mothers during pregnancy; raising it during lactation increased the vitamin stores of the nursing young markedly.

(3) The minimum daily dose of vitamin A necessary to produce storage in the liver was between 25 and 50 blue units. However, when storage had been attained, the reserves were depleted at the rate of 7 to 18 blue units daily, depending upon the amount stored.

(4) When vitamin A was fed in the form of halibut liver oil, the amount stored in the liver was found to parallel the amount administered, but only 10 to 20 per cent. of the vitamin could be accounted for. When equal amounts of vitamin A were fed to normal and to vitamin A-depleted rats, the liver storage was greatest in the normal animals. When equal amounts of vitamin A were fed to ani-

mals in various stages of depletion, the amount stored was inversely proportional to the state of depletion.

(5) Whereas the growth and survival of rats on a vitamin A-deficient diet paralleled both their previous vitamin intake and their vitamin A stores, the period of growth was longer than could be predicted on the basis of liver stores alone. Prolonged growth in the absence of stored or dietary vitamin A was observed.

(6) Absorption and storage of vitamin A to a large extent took place within six hours after the ingestion of the vitamin. Vitamin losses, due to destruction in the digestive tract, were large. Fecal elimination of vitamin A was small.

New Color Reaction of Ammonia. L. Lapin and W. Hein. *Z. anal. Chem., 98,* 236 (1934). Through *Analyst, 59,* 773 (1934). The reaction is based on the appearance of a blue color when a solution containing ammonium salt is shaken with hypobromite and thymol. The reagents are: a 25 per cent. solution of thymol in alcohol, and sodium hypobromite freshly prepared from 1 volume of 2 N sodium hydroxide solution, and 2 volumes of saturated bromine water. The liquid to be tested (5 cc.) is first mixed in a wide test-tube with 1 cc. of thymol solution, then with 12 to 15 cc. of hypobromite solution, and, after one to two minutes, with 5 cc. of ether or xylene. The liquid is cautiously mixed by inverting the tube several times, when the colored compound dissolves in the solvent. The sensitiveness is 0.01 milligram of ammonia per 100 cc., i. e. one-fifth of that of Nessler's reaction. The only interfering metals are lead and platinum, which cause a brownish tint in the ethereal layer; the interference of lead is counteracted by addition of sulphate. Sulphide ion requires an excess of hypobromite. Hydroxylamine and hydrazine salts, as well as hydrogen peroxide, weaken the intensity of the color. Organic compounds do not interfere, with the exception of aniline, which imparts a yellowish-pink tint to the ether.

Rapid Determination of Nitrogen by a Kjeldahl-Nessler Process. W. H. Kitto. *Analyst, 59,* 733 (1934). The following method is proposed: A quantity of 0.5 gram of a solid substance (such as wheat flour, bread, barley), or 2 cc. of a liquid (such as milk, or diluted condensed milk) is introduced into a 100 cc. Kjeldahl flask, together with two small glass beads, and 12.5 cc. of Chiles's mixture (*J. Amer. Chem. Soc., 50,* 217, 1928) to which powdered sodium

selenate is added in the proportion of 1.15 grams per 100 cc. The flask is heated gently, with shaking, for the first five minutes, and the heating then continued in the usual way. If t is the time taken to clear (which is usually about 20 minutes), heat for a total period of 1.75 t. Cool, and wash into a 250 cc. flask, and adjust to the mark. Take 10 cc. of this diluted solution, add phenolphthalein, and titrate with N sodium hydroxide solution. Let the amount of alkali required be s cc. Now transfer 40 cc. from the 250 cc. flask, to a 100 cc. flask, add $(4s-1)$ cc. of N sodium hydroxide solution, to produce a slightly acid reaction, and adjust to the mark. Take 20 cc. of this mixture and nesslerize, using 4 cc. of Nessler's reagent and diluting to 100 cc. If the depth of color is moderate, nesslerize two other quantities of 10 cc. and 30 cc. respectively, using 2 cc. and 4 cc. of Nessler's reagent respectively and making up to 100 cc. If with 20 cc. the color obtained is deep, take two smaller quantities, and if it is unduly pale, take two larger ones for nesslerization, using 2 cc. of Nessler's reagent for the lower and 4 cc. for the higher concentrations. The ammonia-contents of the nesslerized solutions are then determined in the 4 cm. trough of a Hellige comparator by comparison with previously standardized discs. The results by this method were in satisfactory agreement with those obtained by the standard Kjeldahl procedure.

Report on Bromide-Bromate Volumetric Solutions. H. Wales. *J. Assoc. Official Agr. Chem. 17,* 448 (1934). Question had been raised concerning the necessity of using a large excess of bromide in the standard bromide-bromate solution as is now specified by the U. S. P. and A. O. A. C. methods, and also as to the need for more than one such solution, particular comment being made concerning the solution specified for the titration of acetanilid.

Three solutions were prepared. (1) 50 grams of KOH dissolved in water, saturated with bromine, boiled to expel excess of bromine and diluted to 1 liter. (2) 3 grams of $KBrO_3$ and 50 grams of KBr dissolved in water to make 1 liter. (3) 3 grams of $KBrO_3$ and 12 grams of KBr dissolved in water to make 1 liter.

Analyses of acetanilid, phenol, thymol, salicylic acid and procaine hydrochloride yielded identical results with each of the three solutions, from which it is concluded that there is no justification in using the excess of bromide specified in the analysis of acetanilid by the A. O. A. C. method. It is recommended that a solution of

14 grams of $KBrO_3$ and 55 grams of KBr in sufficient water to make 1 liter be used instead of the solution now recommended (A. O. A. C. page 439, 5a) and that this solution may be standardized against acetanilid or 0.1 sodium thiosulphate, after addition of KI and HCl).

It is further recommended that the quantity of KBr used in preparing the standard bromide-bromate solution for the determination of total salicylates (page 446, 25 c) be reduced from 50 grams to 12 grams.

An alternate method for the determination of acetanilid, which depends upon the addition of an excess of the bromide-bromate solution and back titration with 0.1 N sodium thiosulphate, is also recommended.

Report on Nitrites in Tablets. Frank C. Sinton. *J. Assoc. Official Agr. Chem. 17,* 462 (1934). For the assay of nitrites in tablets, when no interfering material is present, it has been found possible to adapt either the U. S. P. permanganate method for the determination of sodium nitrite, or the gasometric determination of spirit of ethyl nitrite. If the tablets contain organic matter and sodium bicarbonate, the former interferes with the permanganate titration and the latter with the gasometric method. Therefore the work reported is confined to methods suitable for such a mixture.

The following method is recommended. Count and weigh a representative number of tablets and powder at least 25, mixing thoroughly. Transfer to a 100 cc. volumetric flask a sample equivalent to about 0.5 gram of sodium nitrite, make up to volume with distilled water, shake thoroughly, and when solution has been assured, filter. Reject the first 10 cc. of solution, then transfer to a 50 cc. aliquot to a 200 cc. volumetric flask. Add 5 cc. of nitric acid (conc), 10 cc. of a saturated potassium chlorate solution, and 20 cc. of a 0.1 N silver nitrate solution. Make up to volume with water, shake thoroughly, and when the silver chloride has settled, filter, rejecting the first 20 cc. Titrate a 100 cc. aliquot of the filtrate with 0.1 N potassium thiocyanate solution.

1 cc. of $AgNO_3$ = 0.020703 gram of $NaNO_2$. Make a determination of chloride if any is present in the tablet, and deduct from the total. Good results were obtained with sodium nitrite C. P. as a control and with tablets containing sodium nitrite, sodium bicarbonate, F. E. Crataegus Ox., and nitroglycerin.

SOLID EXTRACTS

By Ivor Griffith, Sc. D., Ph. M.

The average life expectancy in the United States today is said to be somewhere around fifty-seven years. This does not compare favorably with the alleged record of Methusaleh, whose only excuse for a voice in a verse was that he lived for over nine hundred years of a kind, did nothing, and then died.

More than likely, modern man does more real living in one year, than Methusaleh did in his thousand.

But when the Greeks were ascendant the span of life was only half that of the present—if we believe the conclusions of archeologists, who from Greek epitaphs and writings, tinctured with some useless arithmetic, claim that in Ancient Greece the average person could expect to live only twenty-nine years.

Still it must be admitted, on the bewhiskered, bald-headed evidence, calcium-kept in statuary, that some of those Greek philosophers certainly fooled their statisticians.

"Solid beer" has been known for centuries and was the standby of the vagabond tribes of the Orient on their long and weary treks.

The early Arabs, according to ancient texts, knew the "solid beer" under the name of "saviq"; their predecessors the Babylonians, gave it the more bubbly title of "hubur bulug gar." It was not sold by liquid measure, but in lumps by weight, and was carried wrapped up in packages on camel-back. When the caravan made camp, some of the lumps were soaked in water, which quickly fermented into a refreshing drink of low alcoholic content.

The little bacterium (not yeast) that made the babbling Babylonians call this bubbling imbibition "hubur bulug gar"—is now being bred and brewed by beer bugologists.

The use of the Zanzibar clove as a mask for alcoholic halitosis is being revived. Few know the intriguing, world involving story of the humble clove, once more costly, weight for weight, than pure gold—but now reduced to bar-room tenantry. And to prove that there is nothing new under the sun—we are told that, during one of the Chinese dynasties of the third century B. C., it was customary for officers of the court to chew a clove in the mouth before addressing the sovereign, in order that the breath might hide its warm offensiveness! To which the Listerine copy writer might react with halitotic fervor, "Better one lone drop of ours—than ten cloves in old Cathay!"

According to the Department of Agriculture, colonial dames did all their domestic dyeing with the common plants of field and fen. Furthermore, it states that satisfactory and pleasing shades may even now be made from very *ordinary* and *available* plant materials such as apple bark and juniper berries—onion skins and coreopsis flowers.

And so another manifestation of the back to Nature movement! But more than likely the urban housewife will continue to tint with Rit and Tintex bought, for a song, around the corner.

If the Department wants to do something really unique why not recommend the skin of the radish, the flesh of the pomegranate, or the juice of the red cabbage, whose colors change with sour and caustic mood—and thus afford a change of tone with every change of temper.

Beer is a food, claims the Journal of the American Medical Association, and only a half of its calories come from its alcohol content. The rest come from dextrin and protein-like extractives contained in its water phase.

Beer † is food material "whose fattening properties may be very highly considered" according to one authority cited in the Journal editorial.

Remarkable! Particularly in view of the fact that the beer drinkers of Europe have clinically and anatomically proven this to us for many a long decade.

*But—in view of the fact that the brewer's big horses are here again—Science—so-called—*should *sit at the side of the driver!*

†Substitute the word beans, bread, beef-steak, or what-have-you!

The man at the steering wheel knows the hazards of sleet-storm driving—and particularly the "low visibility" of ice-encrusted windshields. There are many devices available to avoid this fearful distraction to driving. Heating gadgets, soap sticks, glycerin pastes—and even the warm anti-freeze fluid from the radiator has been known to help a bit in emergency. But the recent recommendation of a Jersey gasoliner was to half-split a succulent onion in the raw, and to rub the juice therefrom over the glass.

Accordingly, so was it done—and the rural remedy worked like a miracle—fully justifying the ruminating rustic's wisecrack that "an onion always makes *ice* water."

Wöhler, pioneer of the great synthetic trail, detoured chemistry from its foolish path of mud, when he discovered how, from an inorganic source, to prepare the organic substance urea. Urea had been existent—and readily made by man and beast—a million years before Wöhler—but never before had any man known how thus to compete with Nature herself as a synthesist. But while Wöhler is mostly remembered for this "epoch-making discovery"—the Aluminum Company of America will remember him better as the discoverer of the element aluminum, in 1827. For fifty years or so, thereafter, it was a rare and expensive metal. Nearly five hundred dollars a pound was its early price and even as late as 1884, the aluminum cap or apex of the Washington Monument is said to have cost as much as if it had been made of solid silver.

Today this democratic element fills the kitchen closet with its cookpot ware and makes the crudest commoner an 1830 millionaire.

By rearranging the molecular structure of morphine, scientists have long hoped to produce a compound which might have all or more of the pain killing qualities of that alkaloid with none of its bad habits. Recently an American research chemist has perfected a substance which he calls dihydrodesoxymorphine D, and which is said to be ten times as effective in pain relief as morphine—although its addiction qualities have not yet been studied. Dr. Small, the discoverer, has patented the product and has donated his patent rights to the Secretary of the Treasury, a procedure altogether more humane than that pursued with the German salvarsan, which capitalized to the utmost its specific value in the treatment of syphilis, dread scourge of the centuries.

Test tuberculin has always been a relatively impure extract of the wicked wax-encrusted rod, responsible for the feared disease. For sixty years scientists have endeavored to secure in pure form, the essence of this test material, but it remained for Dr. Florence Seibert of Philadelphia finally to find a method to prepare it.

Crystalline and concentrated is the new product and of immediate application in the diagnostic tests, on man and animal. Furthermore it may prove in some manner or another, useful in the treatment of the great white plague which year after year at the onslaught of science reluctantly yields its hideous hold on life, in man and animal.

BOOK REVIEW

CLINICAL LABORATORY METHODS. By Pauline S. Dimmitt, Ph. G. Pub. by F. A. Davis Co., Philada. Illustr. with 36 engravings inc. 7 colored plates, cloth-bound, 156 pages, inc. index. Price

This is a bold little volume, seeking to compress into its scant bulk all the territory commonly covered by the more ponderous laboratory *manuals,* so called, because they require real *manual* labor to haul them around.

And it does it well!

It is quite obvious however, that the author has had the expected difficulties of one who seeks to simplify by concentration and and to curtail by excision. For there are a few unfortunate omissions which must unnecessarily send the student seeking elsewhere—and there are chapters, such as the one outlining the complement fixation tests where the boiling down has left a dizzy extract.

The illustrations are tiresome and confusing. Most of them are old friends, for we have met them over and over again in similar text books. There is much to be said against borrowed and stereotyped cuts, and more to be said in favor of original illustrations. For instance, the casts depicted on page 11 are entirely out of proportion with the epithelial cells shown above, and the spermatozoa pictured on page 14 seem tadpoley in contrast to the other residue constituents.

But these are only minor defects in a really splendid little volume, that is up-to-date in its contents, terse without being inaccurate, and obviously the work of an efficient clinical chemist and teacher.

It is commended to student and laboratory practitioner as well.

IVOR GRIFFITH.